

Free-boundary simulation of ITER hybrid scenario

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A free-boundary plasma evolution code, DINA-CH, and an advanced core transport code, CRONOS, are combined for the simulations of ITER plasma which require both self-consistent magnetic and kinetic computations. DINA-CH calculates the evolution of a free-boundary plasma equilibrium while taking into account the variation of externally induced currents in the full tokamak system. CRONOS directly makes use of it for the computation of heat and particle sources and their transport. Advanced source and physics based transport models in CRONOS have been used for simulations. Diagnostic models are integrated into DINA-CH for increasing the capability of realistic equilibrium and plasma profile control. For the investigation of fast free-boundary features without degrading the computational performance of either code, additional control of the computation time-steps of the source models has been developed. The free-boundary evolution of the ITER hybrid scenario during the flat-top phase is presented as an illustration of this work.